

# Notice No. 6

## Rules and Regulations for the Classification of Special Service Craft, July 2014

The status of this Rule set is amended as shown and is now to be read in conjunction with this and prior Notices. Any corrigenda included in the Notice are effective immediately.

**Issue date: May 2015**

Amendments to	Effective date
Part 1, Chapter 3, Section 11	1 July 2015
Part 3, Chapter 4, Sections 9 & 12	1 July 2015
Part 9, Chapter 1, Sections 1 & 6	1 July 2015
Part 10, Chapter 1, Sections 6 & 8	1 July 2015
Part 11, Chapter 2, Sections 4 & 5	1 July 2015
Part 13, Chapter 4, Section 1	1 July 2015
Part 15, Chapter 1, Sections 1, 2, 5, 7, 8, 9, 10, 12, 13, 15 & 16	1 July 2015
Part 15, Chapter 2, Sections 1, 2, 3, 8, 11, 14, 15 & 16	1 July 2015
Part 15, Chapter 3, Sections 1, 2, 3, 4, 6, 7, 8 (new), 9, 10, 11 & 12	1 July 2015
Part 16, Chapter 2, Sections 1, 6, 7, 10, 11 & 22 (new)	1 July 2015



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## Part 1, Chapter 3

### Periodical Survey Regulations for Service Craft

Effective date 1 July 2015

#### ■ Section 11 Screwshafts, tube shafts, propellers and water jet units

##### 11.3 Screwshaft Condition Monitoring (SCM)

~~11.3.1 Where oil lubricated shafts with approved oil glands are fitted or where water lubricated sternbush bearings are fitted, and the Owner has complied with the requirements of 11.3.2 or 11.3.3, the ShipRight descriptive note SCM (Screwshaft Condition Monitoring) may be entered in column 6 of the Register Book.~~

**11.3.1** Monitoring records are to be reviewed at annual survey for all vessels assigned the ShipRight descriptive note SCM (Screwshaft Condition Monitoring). The records that are to be maintained for oil and water lubricated bearings are detailed in the following Sections.

**11.3.2** Oil lubricated bearings records are to be available on board that include the following:

(a) Lubricating oil analysis to be carried out regularly at intervals not exceeding six months. ~~The lubricating oil analysis documentation is to be available on board.~~ Each analysis is to include the following minimum parameters:

- water content,
- chloride content,
- bearing material and metal particles content,
- oil ageing (resistance to oxidation), minimum testing to include Viscosity and Total Acid Number (TAN).

(b) **NOTE:** Oil samples are to be taken under service conditions and are to be representative of the oil within the sterntube.

(c) Oil consumption is to be recorded.

(d) Bearing temperatures are to be recorded (two temperature sensors or other approved arrangements are to be provided).

(e) Facilities are to be provided for measurement of bearing weardown.

(f) Oil glands are to be capable of being replaced without withdrawal of the screwshaft.

**11.3.4** Water lubricated bearings records are to be available on board that include the following:

(a) A means of monitoring and recording record of variations in the flow rate of lubricating water using two independent sensors is to be provided.

(b) A means of monitoring and recording record of variations in the shaft power transmission is to be provided.

(c) A maximum permitted weardown of the sternbush is to be submitted and approved wear monitoring equipment is to be fitted. The weardown allowance is to include both the absolute maximum allowable weardown and the weardown at which it is recommended to carry out an inspection and maintenance. An alignment analysis considering both the newly installed clearance and the proposed absolute maximum allowable weardown, demonstrating that the system will operate satisfactorily within these two limits, is to be submitted and approved. Wear monitoring records for the sternbush.

(d) For open loop systems the manufacturer is to submit information regarding the required standard of lubricating water filtration and lubricating water filters or separators are to be fitted which are able to achieve this requirement: the records from equipment for continuous monitoring of water sediment or turbidity alternatively records from a LR approved extractive sampling and testing procedure are to be available on board.

- The lubricating water supply is to be fitted with continuous water sediment measuring or turbidity monitoring equipment. The results are to be recorded and retained on board and made available to LR on request; alternatively
- There is to be a LR approved extractive sampling and testing procedure with the records held on board and made available to LR on request.

Records of cleaning and replacement of lubrication filters/separators are to be maintained on board. The pumping and water filtration system is to be considered part of the continuous survey cycle and is to be subject to a Periodical Survey.

(e) Where a For closed cycle water systems is used, the pumping and water filtration systems are to be considered part of the continuous survey cycle and are to be subject to a Periodical Survey. Water analysis is to be the records from water analysis results carried out regularly at intervals not exceeding six months are to be retained on board. Samples are to be taken under service conditions and are to be representative of the water circulating within the sterntube. Analysis results are to be retained on board and made available to LR on request. The analysis is to include the following parameters:

- (i) Chloride content.
- (ii) Bearing material and metal particles content.

**NOTE:**

Samples are to be taken under service conditions and are to be representative of the water circulating within the sterntube. Records of cleaning and replacement of lubrication filters/separators are to be maintained on board. The pumping and water filtration system is to be considered part of the continuous survey cycle and is to be subject to a Periodical Survey.

(f) The shaft is to either be constructed of corrosion resistant material or protected with a corrosion resistant protective liner or coating approved by LR. Where a protective liner or coating is used this is to meet the requirements of Pt 11, Ch 2.4.14, and a means of assessing the condition of this liner is to be submitted and approved.

(g) Glands are to be capable of being replaced without withdrawal of the screwshaft.

(h) There is to be a shaft starting/clutch engagement block to inhibit starting the shaft until lubricating water flow has been established. This is to only act as a starting block; low lubricating water flow after shaft start is to be alarm only with no shutdown.

## Part 1, Chapter 3

(f) Alternative arrangements are subject to special consideration.  
The means of monitoring and recording lubricating water flow and shaft power variation are to be submitted for approval.

## Part 3, Chapter 4

### Closing Arrangements and Outfit

Effective date 1 July 2015

#### ■ Section 9 Deck drainage

##### 9.4 Scupper arrangements

9.4.4 In craft where an approved fixed pressure water spray fire-extinguishing system is fitted in vehicle or cargo spaces, deck scuppers of not less than 150 mm diameter are to be provided port and starboard, spaced about 9,0 m apart. The scupper area will require to be increased if the design capacity of the drencher system exceeds the Rule required capacity by 10 per cent or more. After installation, the two adjacent sections with the greatest aggregate drencher capacity are to be tested in operation to ensure that there is no build-up of water on the deck. The scuppers are to be led inboard to tanks or, alternatively they may be led overboard providing they comply with 9.4.3(a) and (b). Inboard draining scuppers do not require valves but are to be led to suitable drain tanks (water contaminated with petrol or other flammable substance is not to be drained to machinery spaces or any other space where a source of ignition may be present) and the capacity of the tanks is to be sufficient to hold approximately 40 20 minutes of drenching water. The arrangements for emptying these tanks are to be approved and suitable high level alarms provided. The mouth of the scupper is to be protected by bars.

9.4.5 Scupper pipes from the weather decks discharging overboard below or near the waterline are to be provided with an automatic non-return valve or positive control valve at the shell. Where the scupper pipes are of substantial construction, having a wall thickness of not less than that of the side shell plus 2 mm, the non-return This valve or positive control valve may be omitted where the piping has a minimum wall thickness of:

- 7,0 mm for pipes of 80 mm external diameter or smaller;
- 10,0 mm for pipes of 180 mm external diameter;

Intermediate minimum thicknesses are to be determined by linear interpolation.

9.4.6 For the use of non-metallic pipe, see Pt 15, Ch 1,8 and Pt 15, Ch 15, as applicable.

#### ■ Section 12 Air and sounding pipes

##### 12.1 General

12.1.4 Composite pipes may be acceptable for use on composite craft and will be specially considered.

Existing paragraphs 12.1.5 and 12.1.6 have been renumbered 12.1.4 and 12.1.5.

# Part 9, Chapter 1

## General Requirements for Machinery

Effective date 1 July 2015

### ■ **Section 1** **General requirements**

#### 1.1 **Application**

1.1.4 Special requirements are included for main and auxiliary machinery, pumping and piping, electrical and control engineering and fire extinction for yachts ~~that are 500 gt or more~~.

### ■ **Section 6** **Requirements for craft which are not required to comply with the HSC Code**

#### 6.1 **Plans and particulars**

6.1.1 At least three copies of the following plans are to be submitted for approval at the earliest opportunity:

- Crankshaft including details of the material specification.
- Gearing including details of the material specification.
- Arrangement and details of the propulsion shafting, couplings and bearing disposition, etc.
- Propeller where the diameter exceeds 1 m.
- Diagrammatic arrangements of the exhaust systems indicating the materials, methods of cooling, and if water spray is injected, the method of draining.
- Starting air system and receivers.
- Diagrammatic arrangements of pumping and piping systems including the air and sounding pipes for the tanks.
- Diagrammatic arrangements of bilge and fire water pumps and piping for craft having a Rules length of 12 m and over and which are subdivided into watertight compartments.
- Diagrammatic arrangement of ~~oil~~ fuel oil piping.
- Construction arrangements of separate ~~oil~~ fuel oil tanks having a capacity exceeding 250 500 litres (250 litres for small craft).
- Electrical equipment as detailed in Pt 16, Ch 2.
- Steering gear machinery and hydraulic circuit diagram if applicable.
- Fire extinction equipment as detailed in Part 17.
- Safety plan showing the position of all fire prevention controls, fixed and loose equipment, portable extinguishers, see Pt 17, Ch 1 to 4.
- Control circuits and alarm points as detailed in Pt 16, Ch 1.

# Part 10, Chapter 1

## Diesel Engines

Effective date 1 July 2015

### ■ **Section 6** **Safety arrangements on engines**

#### 6.2 **Crankcase relief valves**

6.2.4 In engines having cylinders not exceeding 200 mm bore or having a crankcase gross volume not exceeding 0,6 m<sup>3</sup>, relief valves may be omitted. Internal combustion engines having a cylinder bore of 200 mm and above or a crankcase volume of 0,6 m<sup>3</sup> and above shall be provided with crankcase explosion relief valves.

### ■ Section 8 Piping systems

#### 8.2 Oil fuel Fuel oil systems

8.2.1 Oil fuel Fuel oil storage arrangements are to comply with the requirements of Pt 15, Ch 3,3 and 3,4, as applicable.

8.2.4 For service craft required to comply with the *International Convention for the Safety of Life at Sea, 1974*, as amended (SOLAS 74) and yachts that are of 500 gt or more in which multi-engined installations are supplied from the same fuel source, means of isolating the fuel supply and spill piping to individual engines are to be provided. These means of isolation are not to affect the operation of the other engines and are to be operable from a position not rendered inaccessible by a fire on any of the engines.

#### 8.3 Oil fuel filters and fittings

8.3.1 Two or more filters are to be fitted in the oil fuel supply lines to the main and auxiliary engines, and the arrangements are to be such that any filter can be cleaned without interrupting the supply of filtered oil fuel to the engines.

8.3.2 Drip trays are to be fitted under oil fuel filters and other fittings which are required to be opened up frequently for cleaning or adjustment or where there is the possibility of leakage. Alternative arrangements may be acceptable and full details should be submitted for consideration.

#### 8.6 Inlet and exhaust systems

8.6.2 Where the exhaust is led overboard near the waterline, means are to be provided to prevent water from being siphoned back to the engine. Where the exhaust is cooled by water spray, the exhaust pipes are to be self-draining overboard. Erosion/corrosion resistant shut-off flaps or other devices are to be fitted on the hull side shell or pipe end and acceptable arrangements made to prevent water flooding the space or entering the engine exhaust manifold.

Existing paragraphs 8.6.3 and 8.6.4 have been renumbered 8.6.2 and 8.6.3.

8.6.4 Where the exhaust is led overboard near the waterline, suitable means are to be provided to prevent water from being siphoned back to the engine in both ahead and astern operation.

8.6.5 Plastic pipes intended for exhaust systems are to be in accordance with a recognised Code or Standard suitable for the intended service conditions. Where the exhaust is cooled by water spray, the exhaust pipes are to be self-draining overboard. Means shall be provided to prevent cooling water from flowing back into the engines when the engines are stopped.

8.6.6 Exhaust systems having components sensitive to heat shall be fitted with a high temperature alarm after water injection. This alarm shall be integrated into the craft's alarm system.

8.6.7 Exhaust pipes penetrating the shell below the bulkhead deck shall be provided with a shipside valve or other approved positive means of closure at the shell to prevent back-flooding into the hull through a damaged exhaust system.

8.6.8 For small service craft not required to comply with the HSC Code, where the lowest point of the exhaust outlet is well above the waterline, alternative arrangements to those specified in 8.6.7 may be submitted for consideration. Details of the alternative arrangements are to be included in the documentation required by 2.1 and are to demonstrate:

- (a) equivalence to 8.6.7 is achieved; and
- (b) compliance with the applicable statutory requirements of the National Authority of the country in which the craft is to be registered.

8.6.9 Remotely controlled valves in the exhaust system, which upon closure will obstruct the flow of the exhaust gases, shall be interlocked to the engine management system such that the engine will stop upon valve closure to prevent possible damage to the exhaust system components.

8.6.10 Plastic pipes intended for exhaust systems are to comply with the relevant requirements in Part 15, Ch 1,8. See Part 15, Ch 1,15.5 for small craft not required to comply with the HSC Code.

#### 8.7 8.3 High pressure oil systems

8.7.1 8.3.1 Where flammable oils are used in high pressure systems, the oil pipe lines between the high pressure oil pump and actuating oil pistons are to be protected with a jacketed piping system capable of preventing oil spray from a high pressure high-pressure line failure.

## Part 11, Chapter 2

### Shafting Systems

Effective date 1 July 2015

#### ■ Section 4 Design and construction

##### 4.2 Intermediate shafts

4.2.5 Where the intermediate shaft is constructed of the same material as the screwshaft and of a material listed in Table 2.4.1, the diameter of the intermediate shaft is not required to be greater than that of the screwshaft.

##### 4.4 Screwshafts and tube shafts

4.4.7 The diameter of unprotected screwshafts and tube shafts of materials ~~having properties~~ as shown in Table 2.4.1 is to be not less than:

$$d_{up} = 128A^{3/4} \sqrt{\frac{P}{R}}$$

where

'A' is taken from Table 2.4.1 and

P and R are as defined in Part 9.

4.4.8 The diameter of unprotected screwshafts of materials ~~having properties~~ as shown in Table 2.4.1 forward of the forward stern tube seal is to be determined in accordance with 4.4.7 or 4.4.3, whichever is less.

Table 2.4.1 Provisional 'A' 'A' Value for use in unprotected screwshaft formula

Material	'A' Value
Stainless steel type 316 (austenitic)	0,71
Stainless steel type 431 (martensitic)	0,69
Manganese bronze	0,8
Aluminium bronze	0,65
Nickel copper alloy – monel 400	0,65
Nickel copper alloy – monel K 500	0,55
Duplex steels	0,49

##### 4.8 Flange connections of couplings

4.8.1 The minimum thicknesses of the coupling flanges are to be equal to the diameters of the coupling bolts at the face of the couplings as required by 4.7.1, and for this purpose the minimum tensile strength of the bolts is to be taken as equivalent to that of the shafts. For intermediate, thrust shafts, and the inboard end of the screwshaft, the thickness of the coupling flange is in no case to be less than 0,20 of the diameter of the intermediate shaft as required by 4.2.4.

##### 4.16 Sternbushes and sterntube arrangement

4.16.8 Where sternbush bearings are oil lubricated, provision is to be made for cooling the oil by maintaining water in the after peak tank above the level of the sterntube or by other approved means. ~~Means for ascertaining the temperature of the oil in the sterntube are also to be provided.~~

4.16.9 Means for ascertaining the temperature of the sternbush bearings are to be provided, e.g. monitoring of the temperature of the oil in the sterntube.

*Existing paragraph 4.16.9 has been renumbered 4.16.10.*

## Part 11, Chapter 2

### ■ Section 5 Control and monitoring

#### 5.2 Screwshaft Condition Monitoring (SCM)

5.2.1 For vessels where the ShipRight descriptive note SCM (Screwshaft Condition Monitoring) is requested, the requirements in either 5.2.2 or 5.2.3 are to be satisfied.

5.2.2 Oil lubricated bearings:

- (a) Arrangements are to be provided to allow analysis of the lubricating oil. Oil samples are to be taken under service conditions and are to be representative of the oil within the sterntube, sampling arrangements are to meet the requirements of Pt 15, Ch 3, 6.4.5.
- (b) Bearing temperature sensor arrangement is to be designed with either:
  - (i) sufficient redundancy in the event of failure of one sensing element and/or its associated cabling; or
  - (ii) means to allow replacement of a damaged sensor without requiring dry-docking or divers.
- (c) Facilities are to be provided for measurement of bearing weardown.
- (d) Approved oil glands that are capable of being replaced without removal of the propeller or withdrawal of the screwshaft are to be fitted.

5.2.3 Water lubricated bearings:

- (a) An approved means of monitoring and recording variations in the flow rate of lubricating water using two independent sensors is to be provided.
- (b) An approved means of monitoring and recording variations in the shaft power transmission is to be provided.
- (c) The maximum permitted weardown of the sternbush is to be indicated by the manufacturer. The maximum weardown is to include both the absolute maximum permitted weardown and the weardown at which it is recommended to carry out an inspection and maintenance. An approved means of monitoring bearing wear is to be provided. An alignment analysis considering both the newly installed clearance and the proposed absolute maximum allowable weardown, demonstrating that the system will operate satisfactorily within these two limits, is to be submitted and approved.
- (d) For open loop systems the manufacturer is to submit information regarding the required standard of lubricating water filtration and lubricating water filters or separators are to be fitted which are able to achieve this requirement. The lubricating water supply is to be fitted with either continuous water sediment measuring equipment, turbidity monitoring equipment or an LR approved extractive sampling and testing procedure.
- (e) Where a closed cycle water system is used, arrangements are to allow analysis of the water for at least the following parameters:
  - (i) Chloride content.
  - (ii) Bearing material and metal particles content.Water samples are to be representative of the water circulating within the sterntube.
- (f) The shaft is to either be constructed of corrosion resistant material or protected with a corrosion resistant protective liner or coating approved by LR. Where a protective liner or coating is used, this is to meet the requirements of Pt 11, Ch 2,4.14, and a means of assessing the condition of this liner is to be submitted and approved.
- (g) Glands are to be capable of being replaced without withdrawal of the screwshaft.
- (h) There is to be a shaft starting/clutch engagement block to inhibit starting the shaft until lubricating water flow has been established. This is to only act as a starting block; for lubricating water flow alarm see Table 2.5.2.
- (j) Alternative arrangements are subject to special consideration.

**Table 2.5.2 Alarm and safeguard for water lubricated bearings**

Item	Alarm	Note
Lubricating water flow	Low	See 5.2.3(h)

## Part 13, Chapter 4

### Shaft Vibration and Alignment

Effective date 1 July 2015

#### ■ **Section 1** **Shaft alignment**

##### **1.2 Particulars to be submitted for approval – Shaft alignment calculations**

1.2.1 Shaft alignment calculations are to be submitted to ~~Lloyd's Register (LR)~~ for approval for the following shafting systems, except where stated otherwise:

- (a) All geared installations where the screwshaft has a diameter of 300 mm or greater in way of the aftmost bearing.
- (b) All geared installations with multiple input/single output, regardless of shaft diameter.
- (c) All direct drive installations which incorporate three or fewer bearings supporting the intermediate and screwshaft aft of the prime mover.
- (d) Where prime movers in a direct drive installation or shaftline bearings are installed on resilient mountings.
- (e) ~~Multiple input/single output geared installations, in which case all such installations will be submitted for approval, regardless of shaft diameter.~~

## Part 15, Chapter 1

### Piping Design Requirements

Effective date 1 July 2015

#### ■ **Section 1** **Application**

##### **1.1 General**

1.1.2 Requirements for small craft of less than 24 m not required to comply with the HSC Code are given in Section 15.

#### ■ **Section 2** **Details to be submitted**

##### **2.1 Plans and information**

2.1.3 The following diagrammatic plans including details of the material and pipe dimensions/thickness:

- ~~Bilge and ballast systems~~ including the capacities of the pumps on bilge service.
- ~~Fuel oil systems~~.
- ~~Tank overflow arrangements~~.
- Lubricating oil systems.
- Flammable liquids used for control and heating systems.
- Power transmission systems for services essential for safety or for the operation of the craft at sea.
- Cooling water systems for main and auxiliary services.
- Compressed air systems for main and auxiliary services.
- Steam systems with a design pressure above 7 bar.

2.1.7 For craft having two or more main engines and multi-hull craft:

- ~~The number of main engines required by the craft to navigate safely.~~

*Existing paragraph 2.1.7 has been renumbered 2.1.8.*

## Part 15, Chapter 1

### ■ Section 5 Carbon and low alloy steels

#### 5.4 Screwed fittings

5.4.1 Screwed fittings including compression fittings may be used in piping systems not exceeding 44 51 mm outside diameter. Where the fittings are not in accordance with an acceptable standard then Lloyd's Register (hereinafter referred to as 'LR') may require the fittings to be subjected to special tests to demonstrate their suitability for the intended service and working conditions.

**Table 1.5.6 Application of mechanical joints**

Systems	Kind of connections		
	Pipe unions	Compression couplings (6)	Slip-on joints
<b>Flammable fluids (Flash point &lt;60°)</b>			
Cargo oil lines	+	+	+5
Crude oil washing lines	+	+	+5
Vent lines	+	+	+3
<b>Inert gas</b>			
Water seal effluent lines	+	+	+
Scrubber effluent lines	+	+	+
Main lines	+	+	+2,5
Distribution lines	+	+	+5
<b>Flammable fluids (Flash point &gt; 60°)</b>			
Cargo oil lines	+	+	+5
Fuel oil lines	+	+	+2,3
Lubricating oil lines	+	+	+2,3
Hydraulic oil	+	+	+2,3
Thermal oil	+	+	+2,3
<b>Sea-water</b>			
Bilge lines	+	+	+1
Fire main and water spray	+	+	+3
Foam system	+	+	+3
Sprinkler system	+	+	+3
Ballast system	+	+	+1
Cooling water system	+	+	+1
Tank cleaning services	+	+	+
Non-essential systems	+	+	+
<b>Fresh water</b>			
Cooling water system	+	+	+1
Condensate return	+	+	+1
Non-essential systems	+	+	+
<b>Sanitary/Drains/Scuppers</b>			
Deck drains (internal)	+	+	+4
Sanitary drains	+	+	+
Scuppers and discharge (overboard)	+	+	—
<b>Sounding/vent</b>			
Water tanks/Sewage tanks/Dry spaces	+	+	+
Oil tanks (f.p.> 60°C)	+	+	+2,3
<b>Miscellaneous</b>			
Starting/Control air (1)	+	+	—
Service air (non-essential)	+	+	+
Brine	+	+	+
CO <sub>2</sub> system	+	+	—

## Part 15, Chapter 1

Steam	+	+	-
<b>KEY</b>			
+ Application is allowed			
— Application is not allowed			
<b>NOTES</b>			
1. Inside machinery spaces of Category A – only approved fire-resistant fire-resistant types.			
2. Not inside machinery spaces of Category A or accommodation spaces. May be accepted in other machinery spaces provided the joints are located in easily visible and accessible positions.			
3. Approved fire-resistant fire-resistant types.			
4. Above freeboard deck only.			
5. In pump rooms and open decks – only approved fire-resistant types.			
65. If compression couplings include any components which are sensitive to heat, they are to be of approved fire-resistant fire-resistant type as required for slip-on joints.			

## ■ Section 7 Cast iron

### 7.1 General

7.1.5 Grey cast iron is not to be used for the following:

- Valves and fittings for boiler blow-down systems and other piping systems subject to shock or vibration.
- Shell valves and fittings, see Ch 2,3.1.
- Valves fitted on the collision bulkhead.
- Valves fitted to tanks containing flammable oil under static pressure.
- Valve chests and fittings for starting air systems, see Part 10, Ch 1.7.4.4.

## ■ Section 8 Plastics Plastic pipes

### 8.1 General

8.1.1 Proposals to The use of plastics pipes will be considered in relation to the properties of the materials, their location, the operating conditions and the intended service and location. Details are to be submitted for approval. Special consideration will be given to any proposed service for plastics pipes not mentioned in these Rules.

8.1.3 Plastics pipes and fittings will, in general, be accepted in Class III piping systems. Proposals for the use of plastics in Class I and Class II piping systems will be specially considered.

8.1.4 Plastics pipes are not acceptable for oil fuel, lubricating oil or other flammable liquid systems in machinery spaces, cargo holds and other spaces of high fire risk.

Existing paragraph 8.1.5 has been renumbered 8.1.4.

8.1.6 8.1.5 For domestic and similar services where there are no Rule requirements, the pipes need not be of a type which has been approved by LR. However, the fire safety aspects as referenced in 8.4, are to be taken into account considered.

Existing paragraph 8.1.7 has been renumbered 8.1.6.

### 8.2 Design and performance criteria

8.2.3 Depending on the service and location, the fire safety aspects such as fire endurance, and fire protection coatings, are to meet the requirements of 8.4.

8.2.4 Plastics piping, connections and fittings is are to be electrically conductive when:

- (a) Carrying fluids capable of generating electrostatic charges.
- (b) Passing through hazardous zones and spaces, regardless of the fluid being conveyed.

Suitable precautions against the build-up of electrostatic charges are to be provided in accordance with the requirements of 8.5, see also Pt 16, Ch 2,1.13.

## Part 15, Chapter 1

### 8.3 Design strength

~~8.3.2 In service, the pipe is not to be subjected to a pressure greater than the nominal internal pressure,  $pN_i$ .~~

~~8.3.3 8.3.2~~ The nominal internal pressure,  $pN_i$ , of the pipe is to be determined by the lesser of the following:

$$pN_i \leq \frac{p_{st}}{4}$$

$$pN_i \leq \frac{p_{st}}{4}$$

$$pN_i \leq \frac{p_{lt}}{2,5}$$

$$pN_i \leq \frac{p_{lt}}{2,5}$$

where

$p_{st}$  = short term hydrostatic test failure pressure, in bar

$p_{lt}$  = long term hydrostatic test failure pressure (100 000 hours), in bar.

~~Due to the length of time stipulated for the long term test, testing may be carried out over a reduced period of time and the results extrapolated using a suitable standard such as ASTM D2837 and ASTM D1598.~~

~~8.3.4 8.3.3~~ The nominal external pressure,  $pN_e$  of the pipe, defined as the maximum total of internal vacuum and external static pressure head to which the pipe may be subjected, is to be determined by the following:

$$pN_e \leq \frac{p_{col}}{3}$$

$$pN_e \leq \frac{p_{col}}{3}$$

where

$p_{col}$  = pipe collapse pressure in bar

The pipe collapse pressure is to be not less than 3 bar.

~~8.3.5 8.3.4~~ Piping is to meet ~~the these~~ design requirements of ~~8.3.2 and 8.3.4~~ over the range of service temperature it will experience.

*Existing paragraphs 8.3.6 and 8.3.7 have been renumbered 8.3.5 and 8.3.6.*

~~8.3.8 8.3.7~~ For guidance, typical temperature and pressure limits are indicated in Tables 1.8.1 and 1.8.2. The Tables are related to water service only. ~~Transport of other media is to be considered on a case by case basis.~~

*Existing paragraphs 8.3.9 and 8.3.10 have been renumbered 8.3.8 and 8.3.9.*

**Table 1.8.2 Typical temperature and pressure limits for glass fibre reinforced epoxy (GRE) and glass fibre reinforced polyester (GRP) pipes**

Min. temperature of deflection under load of resin Minimum heat distortion temperature of resin	Nominal pressure, bar	Maximum permissible working pressure, bar							
		-50°C to 30°C	40°C	50°C	60°C	70°C	80°C	90°C	95°C
80°C	10	10	9	7,5	6				
	16	16	14	12	9,5				
	25	16	16	16	15				
100°C	10	10	10	9,5	8,5	7	6		
	16	16	16	15	13,5	11	9,5		
	25	16	16	16	16	16	15		
135°C	10	10	10	10	10	9,5	8,5	7	6
	16	16	16	16	16	15	13,5	11	9,5
	25	16	16	16	16	16	16	16	15

## Part 15, Chapter 1

### 8.4 Fire performance criteria

8.4.1 Where plastics pipes are used in systems essential for the safe operation of the craft, or for containing combustible fluids or sea-water where leakage or failure could result in fire or in the flooding of watertight compartments, the pipes and fittings are to be of a type which have been fire endurance tested in accordance with the requirements of Table 1.8.3, see also 8.2.3.

### 8.5 Electrical conductivity

8.5.2 Electrical continuity is to be maintained across the joints and fittings and the system is to be earthed, see also Pt 16, Ch 2.1.13. The resistance to earth from any point in the piping system is not to exceed 1 MΩ.

### 8.6 Manufacture and quality control

8.6.1 All materials for plastic pipes and fittings are to be approved by LR, and are in general to be tested in accordance with Ch 14.4 of the Rules for Materials. For pipes and fittings not employing hand lay-up techniques, the hydrostatic pressure test required by Ch 14.4.9 of the Rules for Materials may be replaced by testing carried out in accordance with the requirements stipulated in a National or International Standard, consistent with the intended use for which the pipe or fittings are manufactured, provided there is an effective quality system in place complying with the requirements of Ch 14.4.4 of the Rules for Materials and the testing is completed to the satisfaction of the LR Surveyor.

8.6.2 The material manufacturer's test certificate, based on actual tested data, is to be provided for each batch of material.

8.6.3 Plastic pipes and fittings are to be manufactured at a works approved by LR, using materials approved by LR, in accordance with agreed quality control procedures which shall be capable of detecting at any stage (e.g. incoming material, production, finished article, etc.) deviations in the material, product or process.

8.6.4 Plastic pipes are to be manufactured and tested in accordance with Ch 14.4 of the Rules for Materials. For Class III piping systems the pipe manufacturer's test certificate may be accepted in lieu of an LR Certificate and is to be provided for each consignment of pipe.

**Table 1.8.3 Fire endurance requirements**

Piping systems	Location								
	A Machinery spaces of Category A	B Other machinery spaces and pump rooms	C Special category spaces	D Dry cargo spaces	E Fuel oil tanks	F Ballast water tanks	G Cofferdams, void spaces, pipe tunnel and ducts	H Accommodation service and control spaces	I Open decks
FLAMMABLE LIQUIDS (f.p. > 60°C)									
1 Fuel oil	X	X	X	X	0	0	0	L1	L1
2 Lubricating oil	X	X	X	X	N/A	N/A	0	L1	L1
3 Hydraulic oil	X	X	X	X	0	0	0	L1	L1
SEAWATER <sup>1</sup>									
4 Bilge main and branches	L1 <sup>4</sup>	L1 <sup>4</sup>	X	X	0	0	0	N/A	L1
5 Fire main and water spray	L1	L1	X	N/A	N/A	0	0	X	L1
6 Foam system	L1	L1	N/A	N/A	N/A	N/A	0	L1	L1
7 Sprinkler system	L1	L1	X	N/A	N/A	0	0	L3	L3
8 Ballast	L3	L3	L3	X	0	0	0	L2	L2
9 Cooling water, essential services	L3	L3	N/A	N/A	N/A	0	0	N/A	L2
10 Non-essential systems	0	0	0	0	0	0	0	0	0
FRESH WATER									
11 Cooling water essential services	L3	L3	N/A	N/A	0	0	0	L3	L3

## Part 15, Chapter 1

12 Non-essential systems	0	0	0	0	0	0	0	0	0
ENGINE EXHAUSTS									
13 Main line	0 <sup>1</sup>	0 <sup>1</sup>	0 <sup>1</sup>	0 <sup>1</sup>	N/A	N/A	0 <sup>1</sup>	N/A	L1
14 Drain line	0 <sup>1</sup>	0 <sup>1</sup>	0 <sup>1</sup>	N/A	N/A	N/A	N/A	N/A	N/A
SANITARY/DRAINS/SCUPPERS									
15 Deck drains (internal)	L1 <sup>2</sup>	L1 <sup>2</sup>	L1 <sup>2</sup>	0	0	0	0	0	0
16 Sanitary drains (internal)	0	0	0	0	0	0	0	0	0
17 Scuppers and discharges (overboard)	0 <sup>1,5</sup>	0 <sup>1,5</sup>	0 <sup>1,5</sup>	0 <sup>1,5</sup>	0	0	0	0 <sup>1,5</sup>	0
SOUNDING/AIR									
18 Water tanks/sewage tanks/dry spaces	0	0	0	0	0	0	0	0	0 <sup>7</sup>
19 Oil tanks (f.p. > 60°C)	X	X	X	X	0	0	0	X	X
MISCELLANEOUS									
20 Control air	L1 <sup>3</sup>	L1 <sup>3</sup>	L1 <sup>3</sup>	L1 <sup>3</sup>	0	0	0	L1 <sup>3</sup>	L1 <sup>3</sup>
21 Service air (non-essential)	0	0	0	0	0	0	0	0	0
22 Brine	0	0	0	0	N/A	N/A	0	0	0
23 Low pressure steam (≤ 7 bar)	L2	L2	0 <sup>6</sup>	0 <sup>6</sup>	0	0	0	0 <sup>6</sup>	0 <sup>6</sup>
LOCATION DEFINITIONS									
	Location		Definition						
A	Machinery spaces of Category A		Machinery Spaces of Category A as defined in Part 17, Ch 1,2.4.8.						
B	Other machinery spaces and pump rooms		Spaces, other than Category A machinery spaces containing propelling machinery, boilers, fuel oil units, internal combustion engines, generators and major electrical machinery, pumps, oil filling stations, refrigerating, stabilising, ventilation and air conditioning machinery, and similar spaces, and trunks to such spaces.						
C	Special category spaces		Ro-ro spaces and special category spaces as defined in SOLAS* regulation II-2/3.14 and 3.18.						
D	Dry cargo spaces		All spaces other than ro-ro spaces and special category spaces used for the carriage of dry cargo and trunks to such spaces.						
E	Fuel oil tanks		All spaces used for fuel oil and trunks to such spaces.						
F	Ballast water tanks		All spaces used for ballast water and trunks to such spaces.						
G	Cofferdams, voids, etc.		Cofferdams and voids are those empty spaces between two bulkheads separating two adjacent compartments.						
H	Accommodation service and control spaces		Accommodation spaces, service spaces and control stations as defined in Part 17, Ch 1,2.4.5, 2.4.6, 2.4.10						
I	Open decks		Open deck spaces, as defined in SOLAS* regulation II-2/26.2.2(5).						
* SOLAS 74 as amended by the 1978 SOLAS Protocol and the 1981 and 1983 amendments (consolidated text).									
ABBREVIATIONS									
L1	Fire endurance test in dry conditions, 60 minutes, IMO Resolution A.753(18) Appendix 1.								
L2	Fire endurance test in dry conditions, 30 minutes, IMO Resolution A.753(18) Appendix 1.								
L3	Fire endurance test in wet conditions, 30 minutes, IMO Resolution A.753(18) Appendix 2.								
0	No fire endurance test required.								
N/A	Not applicable.								
X	Plastic pipes not allowed.								
NOTES									
1.	Remotely controlled valves to be provided at ship's side. Valve is to be controlled from outside space. Where the valve is located below the SWL, the operating position is to be above the freeboard deck.								

## Part 15, Chapter 1

2. For drains serving only the space concerned, '0' may replace 'L1'.
3. When controlling functions are not required by the Rules or statutory requirements, '0' may replace 'L1'.
4. For passenger craft, 'X' is to replace 'L1'.
5. Scuppers serving open decks in positions 1 and 2, as defined in regulation 13 of the International Convention on Load Lines, 1966, should be 'X' throughout unless fitted at the upper end with the means of closing capable of being operated from a position above the freeboard deck in order to prevent downflooding. Consideration will be given to the acceptance of other arrangements which provide equivalent protection.
6. For essential services, 'X' is to replace '0'.
7. Air and sounding pipes are to be located in a sheltered position, protected from mechanical damage.

### 8.6 8.7 Installation and construction

*Existing paragraphs 8.6.1 and 8.6.2 have been renumbered 8.7.1 and 8.7.2.*

**8.6.3 8.7.3** Sufficient mechanical joints are to be provided to enable the pipes to be readily removed. Where bonding systems are used, the manufacturer or installer shall provide a written procedure covering all aspects of installation, including temperature and humidity conditions. The bonding procedure is to be approved by LR.

**8.7.4** The person carrying out the bonding is to be qualified. Records are to be available to the Surveyor for each qualified person showing the bonding procedure and performance qualification, together with dates and results of the qualification testing.

**8.7.5** In the case of pipes intended for essential services each qualified person is, at the place of construction, to make at least one test joint, representative of each type of joint to be used. The joined pipe section is to be tested to an internal hydrostatic pressure of four times the design pressure of the pipe system and the pressure held for not less than one hour, with no leakage or separation of joints. The bonding procedure test is to be witnessed by the Surveyor.

**8.7.6** Conditions during installation, such as temperature and humidity, which may affect the strength of the finished joints, are to be in accordance with the agreed bonding procedure.

*Existing paragraphs 8.6.4 to 8.6.6 have been renumbered 8.7.7 to 8.7.9.*

**8.6.5 8.7.8** Where piping systems are arranged to pass through watertight bulkheads or decks, provision is to be made for maintaining the integrity of the bulkhead or deck by means of metallic bulkhead pieces. The bulkhead pieces are to be protected against corrosion and so constructed to be of a strength equivalent to the intact bulkhead; attention is drawn to **8.6.1 8.7.1**. Details of the arrangements are to be submitted for approval.

*Existing sub-Section 8.7 has been renumbered 8.8.*

*Existing paragraphs 8.7.1 and 8.7.2 have been renumbered 8.8.1 and 8.8.2.*

## ■ Section 9

### Austenitic and duplex stainless steel

#### 9.1 General

**9.1.1** Stainless steels may be used for a wide range of services. ~~and are particularly suitable for use at elevated temperatures. For guidance on the use of austenitic steels in sea water systems, see 16.3.4.~~

**9.1.2** Austenitic and duplex stainless steels may be suitable for use at elevated temperatures. Application, environment, operating temperature and time at temperature must be considered in the choice of austenitic or duplex stainless steel grade.

**9.1.3** For guidance on the use of austenitic and duplex stainless steels in sea water systems, see 16.3.4.

**9.1.2 9.1.4** The minimum thickness of stainless steel pipes is to be determined from the formula given in 5.1.2 or 5.1.3 ~~using a corrosion allowance of 0.8 mm~~. Values of the 1.0 per cent proof stress and tensile strength of the material for use in the formula in 5.1.6 may be obtained from Table 6.5.2 in Chapter 6 of the Rules for Materials.

**9.1.3** ~~Where stainless steel is used in lubricating oil and hydraulic oil systems, the corrosion allowance may be reduced to 0 mm.~~

*Existing paragraph 9.1.4 has been renumbered 9.1.5.*

## Part 15, Chapter 1

### Table 1.9.1 Minimum thickness for austenitic and duplex stainless steel pipes

Existing paragraphs 9.1.5 and 9.1.6 have been renumbered 9.1.6 and 9.1.7.

## ■ Section 10 Aluminium alloy

### 10.1 General

10.1.3 Aluminium alloy pipes are not to be used in machinery spaces, ro-ro spaces, special category spaces or cargo holds spaces for conveying oil fuel oil, lubricating oil or other flammable liquids, or for bilge suction pipework within machinery such spaces.

## ■ Section 12 Requirements for valves

### 12.2 Valves with remote control

12.2.3 For shipside valves and valves on the collision bulkhead, the means for local manual operation are to be permanently attached.

### 12.3 Resiliently seated valves

12.3.3 Resiliently seated valves are not to be used in main or auxiliary machinery spaces or in other locations having a significant fire risk as branch or direct bilge suction valves or as pump suction valves from the main bilge line (except where the valve is located in the immediate vicinity of the pump and in series with a metal seated non-return valve. The non-return valve is to be fitted on the bilge main side of the resiliently seated valve). Where they are used in other locations and within auxiliary machinery spaces having little or no fire risk they should be of an approved fire safe type and used in conjunction with a metal seated non-return valve.

## ■ Section 13 Requirements for flexible hoses

### 13.2 Applications for rubber hoses

13.2.2 Rubber or plastics hoses, with integral cotton or similar braid reinforcement, may be used in fresh and sea-water cooling systems. In the case of sea-water systems, where failure of the hoses could give rise to the danger of flooding, the hoses are to be suitably enclosed, as indicated in Ch 2.2.2.3.

## ■ Section 15 Requirements for small craft which are not required to comply with the HSC Code

### 15.5 Plastics pipes

15.5.1 IMO Resolution A.753(18) *Guidelines for the Application of Plastics Pipes on Ships* The requirements of 8.1.2 and 8.4 does not apply.

15.5.2 The requirements of 8.1.5 8.1.4 do not apply but where plastics pipes are used for bilge and cooling water services they are to be of a type which has been approved by LR. However, fire endurance testing is not required, see 15.5.1.

15.5.4 For other services where there are Rule requirements, plastic pipes are to be in accordance with an acceptable National or International Standard and suitable for the intended service conditions.

## Part 15, Chapter 1

15.5.5 Plastic pipes are not to be used in machinery spaces and other spaces of high fire risk or on the open deck for conveying fuel oil, lubricating oil or other flammable liquids or for air and sounding pipes to tanks containing such liquids.

15.5.6 Plastic pipes used on the open deck for air and sounding pipes to other tanks are to be located in a sheltered position, protected from mechanical damage.

15.5.7 Plastic pipes used for overboard scuppers, sanitary discharges and seawater systems are to be provided with an approved ship-side valve. When the ship-side valve is arranged such that in any operating condition of the craft it is near or below the waterline, it is to be capable of being closed from a safe position above the bulkhead deck.

### ■ Section 16 Guidance notes on metal pipes for water services

#### 16.3 Steel pipes

16.3.4 Austenitic and duplex stainless steel pipes are not recommended for salt water services in polluted waters or where stagnant conditions exist. Steel of specification Austenitic stainless steel pipes grades 316L or better 317L and duplex stainless steels grades S31803 or S32750 may give satisfactory service in water circulating systems for clean flowing sea water.

## Part 15, Chapter 2 Hull Piping Systems

Effective date 1 July 2015

### ■ Section 1 General

#### 1.1 Application

1.1.5 Requirements for yachts and service craft of 24 m or more not required to comply with the HSC Code are given in Section 15. The requirements for yachts satisfy the relevant requirements of the UK MCA LY3 Code.

1.1.6 Additional requirements for yachts that are 500 gt or more are given in Section 16.

Existing paragraph 1.1.7 has been renumbered 1.1.6.

1.1.7 Special consideration shall be given to passenger craft not required to comply with the HSC Code.

#### 1.4 Prevention of progressive flooding in damage condition

1.4.1 For craft to which subdivision and damage stability requirements apply, precautions are to be taken to prevent progressive flooding between compartments resulting from damage to piping systems. For this purpose, piping systems are to be located inboard of the assumed extent of damage applicable to the craft type.

1.4.2 Where it is not practicable to locate piping systems as required by 1.4.1, the following precautions are to be taken:

- (a) Bilge suction pipes are to be provided with non-return valves of approved type.
- (b) Other piping systems are to be provided with shut-off valves capable of being operated from positions accessible in the damage condition, or from above the bulkhead deck where required by the Rules.

These valves are to be located in the compartment containing the open end or in a suitable position such that the compartment may be isolated in the event of damage to the piping system.

1.4.3 Where subdivision and damage stability requirements apply and where penetration of watertight divisions by pipes, ducts, trunks or other penetrations is necessary, arrangements are to be made to maintain the watertight integrity.

### ■ Section 2 Construction and installation

#### 2.2 Provision for expansion

2.2.3 Expansion pieces of an approved type incorporating oil resistant rubber or other suitable synthetic material may be used in cooling water lines in machinery spaces. Where fitted in sea-water lines, they are to be provided with guards which will effectively enclose, but not interfere with, the action of the expansion pieces and will reduce to the minimum practicable any flow of water into the machinery spaces in the event of failure of the flexible elements. Where the provision of such guards is not practicable, consideration will be given to alternative arrangements which provide an equivalent level of protection.

Proposals to use such fittings in water lines for other services, including:

- ballast lines in machinery spaces, in duct keels and inside double bottom water ballast tanks, and
- bilge lines inside duct keels only,

will be specially considered when plans of the pumping systems are submitted for approval.

2.2.4 For requirements relating to flexible hoses, see Chapter 1.

### ■ Section 3 Shell valves and fittings (other than those on scuppers and sanitary discharges)

#### 3.1 Construction

3.1.1 All sea inlet and overboard discharge pipes are to be fitted with valves or cocks secured direct to the shell plating, or to fabricated water boxes attached to the shell plating. These fittings are to be secured by studs screwed into heavy pads welded to the plating. The stud holes are not to penetrate the plating.

3.1.2 ~~Distance~~ Alternatively, distance pieces of short rigid construction and made of approved material may be fitted between the valves and the shell plating. The thickness of such pipes is to be equivalent to shell thickness. Distance pieces of steel may be welded to steel shell plating and distance pieces of aluminium alloy may be welded to aluminium alloy shell plating. Details of the welded connections and of fabricated boxes are to be submitted.

3.1.10 For sea connections for craft having notation for ice navigation, see LR's *Rules and Regulations for the Classification of Ships*, Pt 8, Ch 2,3.3, Pt 8, Ch 2,3.5 and Pt 8, Ch 2.5.6.

#### 3.2 Special requirements for composite hulls

3.2.1 The general requirements in 3.1 apply, however the valves or cocks are to be secured to the shell plating as detailed in 14.4.

### ■ Section 8 Pumps on bilge service

#### 8.2 General service pumps

8.2.1 The bilge pumping units or pumps required by 8.1 may also be used for ballast, fire or general service duties of an intermittent nature, but not for pumping fuel or other flammable liquids. These pumps are to be immediately available for bilge duty when required. ~~For the use of bilge pumping units for fire extinguishing duties, see Part 17.~~

### ■ Section 11 Air, overflow and sounding pipes

#### 11.1 Air pipes

11.1.3 Air pipes to oil fuel, lubricating oil and other tanks containing flammable liquids which are located in or pass through compartments of high fire risk or on open deck are to be of steel or other equivalent material. Air pipes are to be made of steel or other approved material. For use of aluminium alloy and plastic pipes of approved type, see Chapter 1.

## Part 15, Chapter 2

11.1.4 Air pipes to fuel oil tanks serving emergency generators may not be led through Category 'A' machinery spaces.

11.1.5 For a normally inaccessible small void compartment such as an echo sounding compartment, which is accessed from within a normally inaccessible space such as a forepeak tank, alternative air pipe arrangements to those required by 11.1.1 may be considered. For such arrangements, a warning notice is to be located in a prominent position specifying the precautions to be taken prior to opening the manhole and entering the small void compartment. Ventilation arrangements are to be submitted to LR for approval.

### 11.8 Combined air and overflow systems

11.8.2 Where tanks vent via a common overflow tank extending to the shell plating, flooding of the overflow tank as a result of damage to the shell plating is not to render the entire venting system inoperable.

*Existing paragraph 11.8.2 has been renumbered 11.8.3.*

### 11.9 Sounding arrangements

11.9.8 For a normally inaccessible small void compartment such as an echo sounding compartment, which is accessed from within a normally inaccessible space such as a forepeak tank, alternative sounding arrangements to those required by 11.9.1 may be considered. For such arrangements, a warning notice is to be located in a prominent position specifying precautions to be taken prior to opening the manhole of the small void compartment. Means are to be provided to indicate flooding of the compartment without opening, such as fitting indicator plugs to the manhole. Sounding arrangements are to be submitted to LR for approval.

11.9.9 Sounding pipes are to be made of steel or other approved material. For use of aluminium alloy and plastic pipes of approved type, see Chapter 1.

### 11.13 Sounding arrangements for ~~oil~~ fuel fuel oil, lubricating oil and other flammable liquids

11.13.7 For service craft required to comply with the *International Convention for the Safety of Life at Sea, 1974*, as amended (SOLAS 74) and yachts that are 500 gt or more, where short sounding pipes serve tanks containing ~~oil~~ fuel fuel oil, an additional sounding device of approved type is to be fitted. In addition, a small diameter self-closing test cock is to be fitted below the cock mentioned in 11.13.6, in order to ensure that the sounding pipe is not under pressure from ~~oil~~ fuel fuel oil before opening up the sounding pipe.

## ■ Section 14

### Requirements for small craft which are not required to comply with the HSC Code

#### 14.3 Fittings for steel and aluminium alloy hulls

14.3.1 All suction and discharge valves and cocks secured direct to the plating are to be fitted with spigots passing through the plating, but spigots on the valves and cocks may be omitted if these fittings are attached to pads or distance pieces which themselves form spigots in way of the plating. All suction and discharge valves and cocks secured direct to the shell plating are to be secured by studs screwed into heavy pads welded to the plating. The stud holes are not to penetrate the plating.

14.3.2 Alternatively, distance pieces of short rigid construction and made of approved material may be fitted between the valve and the shell plating. The thickness of such pipes is to be equivalent to shell thickness. Distance pieces of steel may be welded to steel shell plating and distance pieces of aluminium alloy may be welded to aluminium alloy shell plating.

#### 14.4 Fittings for ~~wood and~~ glass reinforced plastics composite hulls

## Part 15, Chapter 2

### ■ Section 15

#### Requirements for yachts and service craft of 24 m or greater in length, which are not required to comply with the HSC Code

##### 15.1 General

15.1.1 The requirements of Sections 1, 2, 3, 11 and 12 of this Chapter are generally applicable. The remaining Sections 4 to 10 of this Chapter concerning the requirements for bilge pumping and drainage systems are replaced by the requirements given in 15.2 to 15.2830.

##### 15.2 Bilge systems and pumping Drainage of spaces containing low flashpoint fuel

15.2.1 Where it is intended to carry vehicles or craft with fuel in their tanks having a flashpoint (closed-cup test) less than 60°C for their own propulsion and/or having re-fuelling facilities for such vehicles or when only providing re-fuelling facilities or craft, a separate bilge system is to be provided.

15.2.3 For special requirements relating to the separate bilge system, see 15.12.5, 15.14.5, 15.16.4 and 16.

##### 15.3 Drainage of compartments, other than machinery spaces

15.3.1 All craft are to be provided with efficient pumping plant having the suctions and means for drainage so arranged that any water within any compartment of the craft, or any watertight section of any compartment, can be pumped out through at least one suction when the craft is on an even keel and is either upright or has a list of not more than 5°. For yachts a list of not more than 10° shall be assumed. For this purpose, wing suctions will generally be necessary, except in short, narrow compartments where one suction can provide effective drainage under the above conditions.

15.3.3 For a normally inaccessible small void compartment such as an echo sounding compartment, which is accessed from within a normally inaccessible space such as a forepeak tank, alternative drainage arrangements to those required by 15.3.1 may be considered. For such arrangements, a warning notice is to be located in a prominent position specifying the precautions to be taken prior opening the manhole of the small void compartment. Means are to be provided to indicate flooding of the compartment without opening, such as fitting indicator plugs to the manhole. Drainage arrangements are to be submitted to LR for approval.

##### 15.5 Fore and after peaks

15.5.1 Fuel oil, lubrication oil and other flammable oils are not to be carried in forepeak tanks.

Existing paragraphs 15.5.1 and 15.5.2 have been renumbered 15.5.2 and 15.5.3.

15.5.3 15.5.4 Pipes piercing the collision bulkhead are to be fitted with suitable valves secured to the bulkhead inside the forepeak. The valves are to be operable from an accessible position above the freeboard deck on service craft and above the bulkhead deck on yachts. An indicator is to be provided to show whether the valves are open or closed. These valves may be fitted on the after side of the collision bulkhead, provided that they are readily accessible under all service conditions and the space in which they are located is not a cargo space. In the latter case, the valves need not be operable from above the freeboard or bulkhead deck.

15.5.5 On service craft required to comply with the *International Convention for the Safety of Life at Sea, 1974*, as amended (SOLAS 74) and on yachts, valves on the collision bulkhead are to be of a screw-down type.

15.5.6 The collision bulkhead is not to be pierced below the bulkhead deck by more than one pipe for transferring the contents of the fore peak. Where the fore peak is divided into two compartments, the collision bulkhead may be pierced below the bulkhead deck by two pipes (i.e. one for each compartment) provided there is no practical alternative to the fitting of a second pipe. Each pipe is to be provided with a valve as in 15.5.4 and 15.5.5.

15.5.7 For yachts, when it is necessary to lead additional pipes to machinery equipment located inside the forepeak, details are to be included in the documentation required by Ch 1,2.1. Attention is drawn to the provision of additional penetrations in the collision bulkhead being restricted by the UK MCA LY3 Code and an exemption from the National Authority of the country in which the ship is to be registered will be required.

## Part 15, Chapter 2

### 15.8 Bilge drainage of machinery space

15.8.1 The bilge drainage arrangements in the machinery space are to comply with 15.3 except that the arrangements are to be such that any water which may enter this compartment can be pumped out through at least two bilge suctions when the craft is on an even keel, and is either upright or has a list of not more than 5°. For yachts a list of not more than 10° shall be assumed. One of these suctions is to be a branch bilge suction, i.e. a suction connected to the main bilge line, and the other is to be a direct bilge suction, i.e. a suction led direct to an independent power pump.

### 15.9 Separate machinery spaces

15.9.3 In yachts, each bilge pump in 15.14.4 is to have a direct bilge suction from the space in which it is situated. See also 15.19.1.

### 15.10 Machinery space with double bottom

15.10.3 Where there is no double bottom and the rise of floor is not less than 5° on service craft and 10° on yachts, one branch and one direct bilge suction are to be led to accessible positions as near to the centreline as practicable.

### 15.12 Sizes of bilge suction pipes

15.12.1 The diameter,  $d_m$ , of the main bilge line is to be not less than that required by the following formula, to the nearest 5 mm, but in no case is the diameter to be less than that required for any branch bilge suction:

$$d_m = 1,68 \sqrt{L(B+D)} + 25 \text{ mm}$$

where

$d_m$  = internal diameter of main bilge line, in mm

$B$  = greatest moulded breadth of craft, in metres

$D$  = moulded depth to bulkhead deck, in metres

$L$  = Rule length of craft in metres, for service craft.

= length as defined in the International Convention on Load Lines in metres, for yachts.

15.12.5 The cross-sectional area of the main bilge pipe of the system required by 15.2 is to be not less than twice that required for the branch bilge suction pipes in the space.

### 15.14 Pumps on bilge service and their connections

15.14.1 At For service craft, at least two power bilge pumping units are to be provided in the machinery space. One of these units may be worked from the main engines and the other is to be independently driven.

15.14.4 For yachts, at least two power bilge pumps are to be provided, both of which are to be independently driven. The arrangement of the bilge pumps and their individual supplies shall be such that, in the event of any one compartment being flooded at least one of the pumps is available for removing water from the flooded space and adjacent compartments. At least one pump shall be located in the machinery space.

15.14.5 The bilge system required by 15.2 is to be served by at least two dedicated power bilge pumps or bilge ejectors, except in the case of small fuel storage spaces where one bilge pump or ejector may be accepted.

*Existing paragraph 15.14.4 has been renumbered 15.14.6.*

### 15.16 Capacity of pumps

15.16.1 Each bilge pumping unit or bilge pump in 15.14 (except 15.14.5) is to be connected to the main bilge line and is to be capable of giving a speed of water through the Rule size of main bilge pipe line of not less than 122 m/min 2 m/s.

15.16.3 Where In service craft, where one bilge pumping unit is of slightly less than Rule capacity, the deficiency may be made good by an excess capacity of the other unit. In general, the deficiency is to be limited to 30 per cent.

15.16.4 The capacity of each bilge pump or bilge ejector in 15.14.5 is to be not less than that calculated by the formula in 15.16.2. However,  $d_m$  may be replaced by the diameter of the main bilge pipe calculated in 15.12.5.

## Part 15, Chapter 2

### 15.19 Direct bilge suctions

15.19.1 The direct bilge suctions in the machinery space are to be led to independent power pumps, and the arrangements are to be such that these direct suctions can be used independently of the main bilge line suctions. In yachts, when only one independent pump is available in the machinery space, both direct bilge suctions required by 15.10.2 may be led to this pump.

### 15.20 Main bilge line suctions

15.20.1 Suctions from the main bilge line, i.e. branch bilge suctions, are to be arranged to draw water from any ~~hold or machinery~~ compartment within the craft, excepting small spaces such as those mentioned in 15.5 and 15.6 where manual pump suctions are accepted, and are not to be of smaller diameter than that required by the formula in 15.12.2.

### 15.24 ~~Hold~~ Other compartment suctions – Strum boxes

15.24.1 The open ends of bilge suctions in ~~holds and other~~ compartments outside machinery spaces and tunnels are to be enclosed in strum boxes having perforations of not more than 10 mm diameter, whose combined area is not less than twice that required for the suction pipe. The boxes are to be so constructed that they can be cleared without breaking any joint of the suction pipe.

### 15.28 ~~Hold~~ bilge Bilge non-return valves

15.28.1 Where non-return valves are fitted to the open ends of bilge suction pipes ~~in cargo holds~~ in order to decrease the risk of flooding, they are to be of an approved type which does not offer undue obstruction to the flow of water.

### 15.29 Arrangement and control of bilge valves in yachts

15.29.1 Distribution boxes, valves and cocks in connection with the bilge pumping arrangements are to be so arranged that, in the event of flooding of any one compartment, one of the bilge pumps may be operative on that space and adjacent compartments. For this purpose, it may be necessary to arrange for remote control of the bilge suction valves from above the bulkhead deck.

15.29.2 All valves and cocks mentioned in 15.29.1 which can be operated from above the bulkhead deck are to have their controls at their place of operation clearly marked and provided with means to indicate whether they are open or closed.

### 15.30 Bilge level detection

15.30.1 Where **UMS** (Unattended Machinery Space) notation is to be assigned, level alarms are to be provided in machinery space bilges, see Pt 16, Ch 1,4.6.2.

15.30.2 On yachts, high level alarms are to be provided in bilges into which fuel or other oils of similar or higher fire risk could collect, under either normal or fault conditions.

15.30.3 High level alarms are to be provided in bilges of spaces containing low flashpoint fuel.

15.30.4 In addition to the requirements of this Section, for yachts, attention is to be given to any relevant requirements of the UK MCA LY3 Code.

## Section 16

### Additional requirements for yachts that are 500 gt or more

#### 16.1 General

16.1.1 Yachts that are 500 gt or more are to comply with Section 15 of this Chapter and in addition the following requirements.

#### 16.2 Location of bilge pumps and bilge main

16.2.1 At least three power bilge pumps are to be provided, one of which may be operated from the main engines. Wherever practicable they are to be located in separate watertight compartments which will not readily be flooded by the same damage. If the

## Part 15, Chapter 2

engines are in two or more watertight compartments, the bilge pumps are to be distributed throughout these compartments so far as possible.

16.2.2 Where compliance with 16.2.1 is impractical, two independently driven bilge pumps may be accepted provided they are located in separate watertight compartments. If both pumps are necessarily located in the machinery space then one is to be of the submersible type with its source of power located above the bulkhead deck.

16.2.3 The bilge main is to be so arranged that no part is situated nearer the side of the craft than  $B/5$ , measured at right angles to the centreline at the level of the deepest sub-division load line, where  $B$  is the breadth of the craft.

16.2.4 Where any bilge pump or its pipe connection to the bilge main is situated outboard of the  $B/5$  line, then a non-return valve is to be provided in the pipe connection at the junction with the bilge main.

16.2.5 Each independent bilge pump is to have a direct bilge suction from the space in which it is situated, but not more than two such suctions are required in any one space. The suctions are to be arranged such that each side of the space is fitted with at least one suction.

### 16.3 Prevention of communication between compartments in the event of damage

16.3.1 Provision is to be made to prevent the compartment served by any bilge suction pipe being flooded, in the event of the pipe being severed, or otherwise damaged by collision or grounding in any other compartment. For this purpose, where any part of a branch bilge pipe is situated outboard of the  $B/5$  line or in a duct keel, a non-return valve is to be fitted to the pipe in the compartment containing the open end.

### 16.4 Arrangement and control of bilge valves

16.4.1 Distribution boxes, valves and cocks in connection with the bilge pumping arrangements are to be so arranged that, in the event of flooding, one of the bilge pumps may be operative on any compartment.

16.4.2 Where there is only one system of pipes common to all pumps, the arrangements are to be such that if the machinery space or other compartment is flooded then it is possible to operate the necessary valves and cocks in order to take suction from that compartment. For this purpose it may be necessary to arrange for remote control of the bilge suction valves from above the bulkhead deck.

16.4.3 Where, in addition to the main bilge pumping system, an emergency bilge pumping system is provided, it is to be independent of the main system and so arranged that a pump is capable of operating on any compartment under flooding conditions. In this case, only the valves and cocks necessary for the operation of the emergency system need to be capable of being operated from above the bulkhead deck.

16.4.4 All valves and cocks mentioned in 16.4.2 which can be operated from above the bulkhead deck are to have their controls at their place of operation clearly marked and provided with means to indicate whether they are open or closed.

### 16.5 Cross flooding arrangements

16.5.1 Where divided deep tanks or side tanks are provided with cross flooding arrangements to limit the angle of heel after side damage, the arrangements are to be self-acting where practicable. In any case, where controls to cross flooding fittings are provided, they are to be operable from above the bulkhead deck.

## ■ Section 16

### Additional requirements relating to fixed pressure water spray fire-extinguishing systems

#### 16.1 Bilge drainage requirements

16.1.1 Where fixed pressure water spray fire-extinguishing systems are provided for the protection of spaces below the bulkhead deck, the following provisions are to apply:

- The drainage system is to be sized to remove no less than 125 per cent of the combined capacity of both the water spraying system pumps and the required number of fire hose nozzles.
- The required area of the main and branch bilge pipes for the protected space are to be adequate to ensure a maximum water flow of 2 m/s in each section of the piping.
- The drainage system valves are to be operable from outside the protected space at a position in the vicinity of the extinguishing system controls.

## Part 15, Chapter 2

(d) Bilge wells on vehicle decks, ro-ro spaces and special category spaces shall be of sufficient holding capacity and shall be arranged at the side shell of the craft at a distance from each other of not more than 40 m in each watertight compartment.

16.1.2 For drainage of vehicle or cargo spaces by gravity, see Pt 3, Ch 4,9. If led to a closed drain tank, this tank is to be located outside the machinery spaces and provided with a vent pipe leading to a safe location on the open deck.

16.1.3 On craft with closed vehicle spaces, ro-ro spaces and special category spaces, means are to be provided to prevent the blockage of drainage systems from these spaces.

## Part 15, Chapter 3

### Machinery Piping Systems

Effective date 1 July 2015

#### ■ Section 1 Application

##### 1.1 Applicability of requirements

1.1.1 The requirements of Sections 2 to 89 of this Chapter apply to piping systems on mono-hull and multi-hull craft except where modified by Sections 910 to 1112 as applicable.

1.1.2 Special requirements for multi-hull craft are given in Section 910.

1.1.3 These requirements satisfy the relevant design and construction requirements of the HSC Code. They are also applicable to yachts and service craft of more than 24 m or more not required to comply with the Code. The requirements for yachts satisfy the relevant requirements of the UK MCA LY3 Code.

1.1.4 Requirements for Passenger (A) Craft are given in Section 1011.

1.1.5 Requirements for small craft not required to comply with the HSC Code are given in Section 1112.

1.1.6 Special consideration shall be given to passenger craft not required to comply with the HSC Code.

*Existing paragraph 1.1.6 has been renumbered 1.1.7.*

#### ■ Section 2 General requirements

##### 2.2 Fuel oil sampling

2.2.1 Sampling points are to be provided at locations within the fuel oil system that enable samples of fuel oil to be taken in a safe manner.

2.2.2 The position of a sampling point is to be such that the sample of the fuel oil is representative of the fuel oil quality at that location within the system.

### ■ Section 3 Fuel oil storage

3.3 Fuel oil storage arrangements for yachts and service craft of 24 m or greater in length, which are not required to comply with the HSC Code

3.3.4 For yachts that are 500 gt or more, free standing fuel oil tanks are not to be fitted in Category 'A' machinery spaces. ~~Also~~ See also the additional requirements in Pt 17, Ch 3.3.17.3.

3.3.5 The requirements of 3.2.4 to 3.2.8 ~~3.2.9~~ are to be complied with. Where free standing tanks are fitted they are to comply with the requirements of 11.3.1 12.3.1 to 11.3.3 12.3.3.

### ■ Section 4 Fuel oil systems

#### 4.2 Booster pumps

4.2.1 Where a fuel oil booster pump is fitted, which is essential to the operation of the main engine, a standby pump is to be provided. ~~The standby pump is to be connected ready for immediate use.~~

4.2.2 ~~The standby pump is to be connected ready for immediate use, but where two or more main engines are fitted, each with its own pump, a complete spare pump may be accepted provided that it is readily accessible and can easily be installed and the craft cannot navigate safely with one of the main engines out of action, the main engines are to be provided with a standby pump as detailed in 4.2.1.~~

4.2.3 ~~Ships intending to use Heavy Fuel Oil (HFO) or Marine Diesel Oil (MDO) when operating outside emissions control areas and marine fuels with a sulphur content not exceeding 0.1 per cent m/m and minimum viscosity of 2 cSt when operating inside emission control areas are additionally to meet the requirements of 4.2.4. or 4.2.5. Where two or more main engines are fitted, each with its own pump, and the craft can navigate safely with one of the main engines out of action, standby pumps are not required.~~

4.2.4 ~~The booster pumps which are fitted in compliance with 4.2.1 and 4.2.2. are acceptable for use in emissions control areas where these pumps are each suitable for marine fuels with a sulphur content not exceeding 0.1 per cent m/m and minimum viscosity of 2 cSt operation at the required capacity for normal operation of propulsion machinery. Fuel oil booster pumps are to be suitable for all types of fuel used by the craft.~~

4.2.5 ~~When the booster pumps which are fitted in compliance with 4.2.1 are suitable to operate on marine fuels with a sulphur content not exceeding 0.1 per cent m/m and minimum viscosity of 2 cSt, but one pump alone is not capable of delivering marine fuels with a sulphur content not exceeding 0.1 per cent m/m and minimum viscosity of 2 cSt at the required capacity, two pumps may operate in parallel to achieve the required capacity for normal operation of propulsion machinery. In this case, one additional (third) booster pump is to be provided. The additional booster pump is, when operating in parallel with one of the pumps in 4.2.1, to be suitable for and capable of delivering marine fuels with a sulphur content not exceeding 0.1 per cent m/m and minimum viscosity of 2 cSt at the required capacity for normal operation of the propulsion machinery.~~

#### 4.3 Fuel valve cooling pumps

4.3.1 Where pumps are provided for fuel valve cooling, the arrangements are to be in accordance with 4.2.1 and 4.2.2 to 4.2.3.

#### 4.10 Filling arrangements

4.10.2 ~~Provision~~ When the tanks are filled from shore under pressure, provision is to be made against overpressure in the filling pipelines. Any relief valve fitted for this purpose is to discharge to an overflow tank or other safe position.

#### 4.11 Precautions against fire

4.11.1 Pipes, valves and couplings conveying flammable fluids fuel oil are to be installed, screened or otherwise suitably protected, to avoid spray or leakages onto hot surfaces, into machinery air intakes, or other sources of ignition such as electrical equipment. ~~The number of~~ Pipe joints in such systems are to be kept to a minimum and where provided are to be of a type acceptable to LR.

4.11.2 Pumps, filters and heaters are to be located to avoid oil spray or oil leakages onto hot surfaces or other sources of ignition, or onto rotating machinery parts. Where necessary, shielding is to be provided and the arrangements are to allow easy access for routine maintenance.

## Part 15, Chapter 3

4.11.3 The design of filter and strainer arrangements is to be such that they may not be opened inadvertently when under pressure. This may be achieved by either mechanically preventing the pressurised filter from being opened or by providing pressure gauges which clearly indicate which filter is under pressure. In either case, suitable means for pressure release are to be provided, with drain pipes led to a safe location.

4.11.4 Drip trays are to be fitted under fuel oil appliances which are required to be opened up frequently for cleaning or adjustment and at pipes, pumps, valves and other fittings where there is the possibility of leakage. Alternative arrangements may be acceptable and full details should be submitted for consideration.

4.11.5 Short sounding pipes fitted to fuel oil tanks are to be in accordance with Ch 2,11.11.2.

### 4.12 Fuel oil service tanks

4.12.1 A fuel oil service tank is a fuel oil tank which contains only the required quality of fuel ready for immediate use.

4.12.2 On service craft required to comply with the *International Convention for the Safety of Life at Sea, 1974*, as amended (SOLAS 74) and on yachts that are 500 gt or more, two fuel oil service tanks, for each type of fuel used on board, necessary for propulsion and generator systems, are to be provided. Each tank is to have a capacity for at least eight hours' operation, at sea, at maximum continuous rating of the propulsion plant and/or generating plant associated with that tank.

4.12.3 The arrangement of fuel oil service tanks is to be such that one tank can continue to supply fuel oil when the other is being cleaned or opened up for repair.

## ■ Section 6 Lubricating/hydraulic oil systems

### 6.1 Lubricating oil arrangements

6.1.1 The arrangements for the storage, distribution and utilisation of oil used in pressure lubrication systems in machinery spaces and, whenever practicable, in auxiliary machinery spaces are to comply with the provisions of 3.2 (except 3.2.2), 3.4 and, 4.9 (except 4.9.3), 4.11.1, 4.11.2 and 4.11.3.

6.1.3 Where lubricating oil tanks have a capacity of less than  $0.5 \text{ m}^3$ , consideration will be given to relaxing the requirements for remote controls to be fitted. For craft not required to comply with the HSC Code, the requirements for remote operation on valves on deep tank suction pipes may be waived where the valves are closed during normal operation.

6.1.4 Remotely operated valves on lubricating oil deep tank suction should not be of the quick-closing type where inadvertent use would endanger the safe operation of the main propulsion and essential auxiliary machinery.

*Existing paragraph 6.1.4 has been renumbered 6.1.5.*

6.1.5 6.1.6 In addition, yachts and service craft of 24 m or greater in length are to comply with the requirements of 4.5 to 4.7.

### 6.3 Lubricating/hydraulic oil standby arrangements

6.3.1 Where lubricating oil for the main engine(s) is circulated under pressure, a standby lubricating oil pump is to be provided where the following conditions apply:

- (a) The lubricating oil pump is independently driven and the total output of the main engine(s) exceeds 500 kW.
- (b) One main engine with its own lubricating oil pump is fitted and the output of the engine exceeds 500 kW.
- (c) More than one engine each with its own lubricating oil pump is fitted and the output of each engine exceeds 500 kW.

6.3.2 The standby pump is to be of sufficient capacity to maintain the supply of oil for normal conditions with any one pump out of action. The pump is to be fitted and connected ready for immediate use, ~~except that where the conditions referred to in 6.3.1(c) apply, a complete spare pump may be accepted and the craft cannot navigate safely with one of the main engines out of action, the main engines are to be provided with a standby pump.~~ In all cases, satisfactory lubrication of the engines is to be ensured while starting and manoeuvring.

6.3.3 Where the conditions referred to in 6.3.1(c) apply and the craft can navigate safely with one of the main engines out of action, standby pumps are not required.

6.3.3 6.3.4 Similar provisions to those of 6.3.1 and 6.3.2 to 6.3.3 are to be made where separate lubricating/hydraulic oil systems are employed for piston cooling, reduction gears, oil operated couplings, controllable pitch propellers and steering systems etc., unless approved alternative arrangements are provided.

*Existing paragraph 6.3.4 has been renumbered 6.3.5.*

### ■ Section 7 Engine cooling water systems

#### 7.3 Standby supply

7.3.2 The following arrangements are acceptable depending on the purpose for which the cooling water is intended:

- (a) Where only one main engine is fitted, the standby pump is to be connected ready for immediate use.
- (b) Where more than one main engine is fitted, each with its own pump, a complete spare pump of each type may be accepted and the craft cannot navigate safely with one of the main engines out of action, the main engines are to be provided with a standby pump as detailed in (a).
- (c) Where more than one main engine is fitted, each with its own pump and the craft can navigate safely with one of the main engines out of action, standby pumps are not required.
- (d) Where fresh water cooling is employed for main and/or auxiliary engines, a standby fresh water pump need not be fitted if there are suitable emergency connections from a salt water system.
- (e) Where each auxiliary engine is fitted with a cooling water pump, standby means of cooling need not be provided. Where, however, a group auxiliary engine is supplied with cooling water from a common system, a standby cooling water pump is to be provided for this system.

This pump is to be connected ready for immediate use and may be a suitable general service pump.

#### 7.6 Sea inlets

7.6.2 Where standby pumps are not connected ready for immediate use provided (see 7.3.2(bc) and (de)), the main pump is to be connected to both sea inlets.

### ■ Section 8 Low pressure compressed air systems

#### 8.1 General

8.1.1 The requirements of this Section are applicable to low pressure (LP) compressed air systems intended for essential pneumatic control and instrumentation purposes.

8.1.2 Compressed air systems used for diesel engine starting are to comply with the requirements of Part 10, Ch 1,7.

#### 8.2 Compressors and reducing valves/stations

8.2.1 Where LP air is not derived from the starting air system, at least two LP air compressors are to be provided. The output of any one compressor is to match the total demand of all essential users. The system is to be arranged for auto-start of the compressors.

8.2.2 If only one LP air compressor is to be provided, a cross-connection to the starting air system is to be made via a reducing valve/cross-connection station.

8.2.3 Where LP air is derived only from the starting air system, each starting air compressor is to have sufficient capability of supplying the total demand on the LP air system.

#### 8.3 Air receivers

8.3.1 The LP air system and any associated air receivers are to be configured to provide sufficient stored energy to supply LP compressed air without the pressure in the system falling below a level that is insufficient for the operation of all essential users. See also Pt 16, Ch 1,2.5.11.

8.3.2 All air receivers are to comply with the requirements of Chapter 4 as applicable.

8.3.3 Stop valves on air receivers are to permit slow opening to avoid sudden pressure rises in the piping system.

#### 8.4 Distribution system

8.4.1 Drain pots with drain valves are to be provided throughout the distribution system at all low points.

## Part 15, Chapter 3

8.4.2 Pipelines that are situated on the low pressure side of reducing valves/stations and that are not designed to withstand the full pressure of the source supply, are to be provided with pressure gauges and with relief valves having sufficient capacity to protect the piping against excessive pressure.

8.4.3 In-line filters capable of being cleaned/changed without interrupting the flow of filtered air are to be fitted in the system.

### 8.5 Pneumatic remote control valves

8.5.1 Where valves, which are required by the Rules to be capable of being closed from outside a machinery space in the event of a fire, have pneumatic closing arrangements, the arrangements are to comply with 8.5.2 to 8.5.5.

8.5.2 A dedicated air receiver is to be fitted to supply compressed air to the valves. This air receiver is to be located outside the machinery space.

8.5.3 The air receiver is to be maintained fully charged from the main LP air system via a non-return valve located at the air receiver inlet which is to be locked in the open position.

8.5.4 In the case of passenger craft, a permanently attached hand-operated compressor capable of charging the air receiver is to be provided in the space in which the air receiver is located.

8.5.5 The capacity of the air receiver is to be sufficient to operate all valves and any other essential supplies such as ventilation flaps without replenishment.

8.5.6 Where valves, which are required by the Rules to be capable of being operated in the event of a flooding, are pneumatically operated, the arrangements are to comply with 8.5.7.

8.5.7 A compressor is to be fitted to supply compressed air to the valves. This compressor is to be located in a position accessible in the flooding condition. Where valves are required by the Rules to be operable from above the bulkhead deck, the compressor is to be located above the bulkhead deck. Consideration shall be given to alternative arrangements which are equivalent to those required by the Rules.

### 8.6 Control arrangements

8.6.1 The control, alarm and monitoring systems are to comply with Pt 16, Ch 1.

*Existing Section 8 has been renumbered Section 9.*

## ■ Section 9 10 Special requirements for multi-hull craft

### 9.1 10.1 General

9.1.1 10.1.1 The requirements of Sections 1 to 89 are generally applicable to multi-hull craft except where these are modified by the requirements of this Section.

9.1.2 Where the machinery piping arrangements in each hull of a multi-hull craft are separate, the machinery piping and standby requirements for each hull are to be as detailed in 6.3.1(c) and 7.3.2(b), i.e. the requirements for a twin-engined mono-hull craft apply.

9.1.3 10.1.2 Where the machinery piping arrangements in each hull of a multi-hull craft are separate and the craft cannot navigate safely with the main propulsion machinery in one hull out of action, the machinery piping and standby requirements are to be as detailed in 4.2.1, 6.3.1(a) or (b), and 7.3.2(a), i.e. the requirements for a single-engined mono-hull craft apply to the machinery in each hull.

10.1.3 Where a multi-hull craft can navigate safely with the main propulsion machinery in one hull out of action, standby pumps need not be provided.

## Part 15, Chapter 3

### ■ **Section 10 11**

#### **Requirements for Passenger (A) Craft**

##### **10.1 11.1 General**

**10.1.1 11.1.1** The requirements of Sections 1 to 910 apply except that the standby machinery arrangements detailed in Sections 6 and 7 are not required.

### ■ **Section 11 12**

#### **Requirements for small craft which are not required to comply with the HSC Code**

*Existing sub-Section 11.1 has been renumbered 12.1.*

##### **11.2 12.2 Fuel oil system**

**12.2.3** Where a fuel oil booster pump is fitted, a standby pump is to be provided. The standby pump is to be connected ready for immediate use.

*Existing sub-Sections 11.3 to 11.8 have been renumbered 12.3 to 12.8.*

##### **11.9 12.9 Engine cooling system**

**12.9.5** A standby cooling water pump is to be provided. The standby pump is to be connected ready for immediate use.

##### **11.10 12.10 Lubricating oil system**

**12.10.7** Where the output of the main engine exceeds 500 kW, a standby lubricating oil pump is to be provided. The standby pump is to be connected ready for immediate use.

#### **12.11 Multi-engined craft**

**12.11.1** This Section is applicable to craft that have multi-engine installations for propulsion purposes.

**12.11.2** Where each main engine has its own fuel oil booster pump, lubricating oil and cooling water pump and the craft can manoeuvre safely with one of the main engines out of action, the following are not required:

- (a) Standby fuel oil transfer pump stipulated in 12.2.2.
- (b) Standby fuel oil booster pump stipulated in 12.2.3.
- (c) Standby cooling water pump stipulated in 12.9.5.
- (d) Standby lubricating oil pump stipulated in 12.10.7.

#### **12.12 Craft having restricted services G1 to G2A**

**12.12.1** If the craft has a service area restriction notation **G1 to G2A**, the following are not required:

- (a) Standby fuel oil transfer pump stipulated in 12.2.2.
- (b) Standby fuel oil booster pump stipulated in 12.2.3.
- (c) Standby cooling water pump stipulated in 12.9.5.
- (d) Standby lubricating oil pump stipulated in 12.10.7.
- (e) Standby pneumatic air compressor stipulated in 8.2.1.

# Part 16, Chapter 2

## Electrical Engineering

Effective date 1 July 2015

### ■ Section 1 General requirements

#### 1.3 Documentation required for supporting evidence

1.3.6 Details of, and arrangements in, the spaces in which the lighting is required to satisfy the requirements of Section 22 Ergonomic Lighting Design (EDL) optional notation.

### ■ Section 6 System design – Protection

#### 6.3 Protection against overload

6.3.2 Fuses of a type intended for short-circuit protection only (e.g. ~~fuse-links~~ high-voltage fuses or fuses complying with IEC 60269-1: *Low-voltage fuses – Part 1: General requirements*, of type “~~a~~” ‘~~a~~’) are not to be used for overload protection.

#### 6.8 Protection of generators

6.8.5 Generators All high-voltage generators and low-voltage generators having a capacity of 1500 kVA or above are to be equipped with a protective device which, in the event of a short-circuit in the generator or in the cables between the generator and its ~~circuit breaker~~ circuit-breaker, will instantaneously open the ~~circuit breaker~~ circuit-breaker and de-excite the generator.

### ■ Section 7 Switchgear and control gear controlgear assemblies

#### 7.1 General requirements

7.1.1 Switchgear and control gear controlgear assemblies and their components are to comply with ~~one~~ of the following standards, as appropriate for the nominal voltage, and amended where necessary for ambient temperature and other environmental conditions:

- (a) IEC 61439: *Low-voltage switchgear and control gear controlgear assemblies* (relevant parts);
- (b) IEC 62271-200: *High-voltage switchgear and controlgear – Part 200: AC metal-enclosed switchgear and controlgear for rated voltages above 1 kV and up to and including 52 kV*;
- (c) IEC 62271-201: *High voltage switchgear and control gear controlgear – Part 201: AC insulation-enclosed switchgear and control gear controlgear for rated voltages above 1 kV and up to and including 52 kV*;
- (d) IEC 60092-503: *Electrical installations in ships – Part 503: Special features – AC supply systems with voltages in the range of above 1 kV up to and including 15 kV*;
- (e) IEC 60255: *Measuring relays and protection equipment*, or
- (f) an acceptable and relevant National Standard.

In addition, the requirements of 7.2 to 7.19 are to be complied with.

#### 7.6 Degree of protection

7.6.3 Segregation between low-voltage and high-voltage circuits and equipment installed within common assemblies is to be in accordance with IEC 62271-1: *High-voltage switchgear and controlgear – Part 1: Common specifications*.

## Part 16, Chapter 2

### ■ Section 10 Converter equipment

#### 10.1 Transformers

10.1.2 Transformers are to comply with the requirements of the following standards: IEC 60076 (all parts): *Power transformers*, or an acceptable and relevant National Standard amended where necessary for ambient temperature, see 1.9.

- (a) IEC 60076 (all parts): *Power transformers* (all parts);
- (b) IEC 60092-503: *Electrical installations in ships – Part 503: Special features – AC supply systems with voltages in the range of above 1 kV up to and including 15 kV*; or
- (c) an acceptable and relevant National Standard amended where necessary for ambient temperature, see 1.9.

### ■ Section 11 Electric cables, optical fibre cables and busbar trunking systems (busways)

#### 11.8 Installation of electric cables

11.8.16 ~~High voltage~~ High-voltage electric cables are to be segregated as far as is practicable from electric cables operating at lower voltages.

### ■ Section 22 Ergonomic Lighting Design – ELD optional notation

#### 22.1 Objectives

22.1.1 The requirements in this Section are applicable where the optional class notation for ergonomic lighting design is requested.

22.1.2 The design and installation of indoor lighting is to facilitate visual task performance, safety and visual comfort. In order to achieve this goal the requirements of 22.2 to 22.6 are to be complied with.

22.1.3 The requirements in this Section do not address emergency or navigational lighting.

#### 22.2 Positioning and installation

22.2.1 In order to meet the ergonomic requirements of 22.3 to 22.6 the positioning and installation of lights is to comply with 22.2.2 to 22.2.11.

22.2.2 Natural lighting through the use of windows and doors is to be provided as far as practicable.

22.2.3 Lights are to be positioned, as far as practicable, in the same horizontal plane and arranged symmetrically to produce a uniform level of illumination.

22.2.4 Lights are to be positioned so as to reduce bright spots and shadows as far as possible.

22.2.5 Lights are to be positioned taking account of structures such as beams and columns etc. so the lighting is not blocked by these items.

22.2.6 Lights are not to be positioned in locations which would result in limited illumination.

22.2.7 Lights are to be positioned taking account of air-conditioning vents or fans, fire detectors, water sprinklers etc., so the lighting is not blocked by these items.

22.2.8 The position of lights configured to strips or tubes is, as far as practicable, to be at right angles to an operator's line of sight while the operator is located at their typical duty station.

22.2.9 Any physical hazards that provide a risk to operator safety are to be appropriately illuminated.

22.2.10 The positioning of lights is to consider the transfer of heat to adjacent surfaces.

## Part 16, Chapter 2

22.2.11 Lights are to be positioned in locations that are easy to reach for lamp replacement or maintenance.

### 22.3 Luminance distribution

22.3.1 In order to provide even, fatigue-free illumination the requirements of 22.3.2 to 22.3.6 are to be complied with.

22.3.2 The light levels falling on the plane in which a task is performed are to be suitable for the type of task, i.e. they are to consider the variation in the working planes.

22.3.3 Sharp contrasts in illumination levels across an operator task or working plane are to be avoided, as far as possible.

22.3.4 Sharp contrasts in illumination levels between an operator task area and the immediate surround and general background area are to be avoided, as far as possible.

22.3.5 Where required, local lighting for operational tasks is to be provided in addition to general lighting.

22.3.6 Lighting is to be free of perceived flicker.

### 22.4 Glare

22.4.1 In order to minimise glare (to avoid dazzle, discomfort and fatigue) the requirements of 22.4.2 to 22.4.6 are to be complied with.

22.4.2 Lights are to be positioned so as to reduce, as far as possible, glare or high brightness reflections from working and display surfaces.

22.4.3 Lights are to be positioned so as to provide even illumination and minimal glare on controls, displays and indicators.

22.4.4 Where necessary, suitable blinds and shading devices are to be used to prevent glare.

22.4.5 Surfaces are to have a non-reflective or matt finish in order to reduce the likelihood of indirect glare.

22.4.6 Where a transparent cover is fitted over a control, display or indicator, it is to be designed to minimise reflections.

### 22.5 Location of lighting controls and outlets

22.5.1 In order to allow convenient use of lighting the requirements of 22.5.2 to 22.5.6 are to be complied with.

22.5.2 The lighting system is to be easily maintained and operated by personnel.

22.5.3 Lighting is to be controllable locally in accommodation and working areas, except where this conflicts with safety requirements.

22.5.4 Light switches are to be fitted in safe positions for personnel.

22.5.5 The mounting height of switches is to be such that personnel can reach switches with ease.

22.5.6 Power outlets are to be provided where temporary, local, task lighting will be required, except in hazardous areas.

### 22.6 Night vision

22.6.1 In order to maintain night vision and facilitate safety during hours of darkness the requirements of 22.6.2 to 22.6.4 are to be complied with.

22.6.2 Lighting on the ship's superstructure is to be directed away from, and shaded to prevent direct illumination of, the bridge windows and lookout points.

22.6.3 Instrument lighting is to be such that the operator can read dials and indicators without impediment of night vision.

22.6.4 Lighting of instruments, keyboards and controls, is to be adjustable down to zero, except for the lighting of alarm and warning indicators and the controls of dimmers, which are to remain readable.

## Cross-References

Section numbering in brackets reflects any Section renumbering necessitated by any of the Notices that update the current version of the Rules for Special Service Craft.

### **Part 1, Chapter 3**

11.3.5 *now* 11.3.6      Reference to Part 1, Chapter 3, 11.3.3 (f)  
*now reads* Part 11, Chapter 2, 5.2.3 (f)

### **Part 15, Chapter 1**

8.6.5 *now* 8.7.8      Reference to Part 15, Chapter 1, 8.6.1  
*now reads* Part 15, Chapter 1, 8.7.1

15.5.2      Reference to, Part 15, Chapter 1, 8.1.5 *now reads*  
Part 15, Chapter 1, 8.1.4

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